Descriptions

1W isolated DC-DC converter

3 Years Warranty

RoHS

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- High efficiency up to 83%
- The leakage current < 2μA
- Isolation Capacitance as low as 4pF
- Creepage & Clearance Distance > 5mm
- Reinforced insulation, Isolation voltage: 5000VAC or 6000VDC
- Operating ambient temperature range: -40℃ to+105℃
- Continuous short-circuit protection

Applications

- Medical
- Electricity
- IGBT driver

Selection Guide

Certification	Part No*	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF) Max.
		Nominal (Range)	Voltage(VDC)	Current (mA) Max./Min.		
--	DFS1-G0503	5 (4.5-5.5)	±3.3	±152/±15	71/75	1000
--	DFS1-G0505		±5	±100/±10	76/80	1000
--	DFS1-G0509		±9	±56/±6	76/80	470
--	DFS1-G0512		±12	±42/±5	77/81	220
--	DFS1-G0515		±15	±34/±4	77/81	220
--	DFS1-H0503		3.3	303/31	71/75	2200
--	DFS1-H0505		5	200/20	76/80	2200
--	DFS1-H0509		9	111/11	76/80	1000
--	DFS1-H0512		12	84/9	77/81	470
--	DFS1-H0515		15	67/7	77/81	470
--	DFS1-H0524		24	42/4	77/81	220
EN/BS EN	DFS1-H1203	12 (10.8-13.2)	3.3	303/31	72/76	2200
EN/BS EN	DFS1-H1205		5	200/20	75/79	2200
EN/BS EN	DFS1-H1209		9	111/12	77/81	680
EN/BS EN	DFS1-H1212		12	84/9	79/83	470
EN/BS EN	DFS1-H1215		15	67/7	79/83	470

EN/BS EN	DFS1-H1224		24	42/4	78/82	220
EN/BS EN	DFS1-G1205		±5	±100/±10	75/79	1000
EN/BS EN	DFS1-G1209		±9	±56/±6	75/79	470
EN/BS EN	DFS1-G1212		±12	±42/±5	77/81	200
EN/BS EN	DFS1-G1215		±15	±34/±4	77/81	200
EN/BS EN	DFS1-G1505	15 (13.5-16.5)	±5	±100/±10	73/77	1000
EN/BS EN	DFS1-G1512		±12	±42/±5	75/79	220
EN/BS EN	DFS1-G1515		±15	±33/±4	75/79	220
EN/BS EN	DFS1-G2405	24 (21.6-26.4)	±5	±100/±10	71/75	1000
EN/BS EN	DFS1-G2409		±9	±56/±6	71/75	470
EN/BS EN	DFS1-G2412		±12	±42/±5	72/76	220
EN/BS EN	DFS1-G2415		±15	±34/±4	72/76	220
EN/BS EN	DFS1-H2405		5	200/20	72/76	2200
EN/BS EN	DFS1-H2409		9	111/12	72/76	680
EN/BS EN	DFS1-H2412		12	84/9	72/76	470
EN/BS EN	DFS1-H2415		15	67/7	72/76	470
EN/BS EN	DFS1-H2424		24	42/4	72/76	220

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	5V input		--	250/14	282/--	mA
		12V input		--	106/10	116/--	
		15V input		--	90/10	100/--	
		24V input		--	56/12	59/--	
	Reflected Ripple Current			--	200	--	
	Surge Voltage (1sec. max.)	5V input		-0.7	--	9	VDC
		12V input		-0.7	--	18	
		15V input		-0.7	--	21	
		24V input		-0.7	--	30	
	Input Filter			Capacitance filter			
	Hot Plug			Unavailable			
Output Specifications	Voltage Accuracy			See output regulation curve (Fig. 1)			
	Linear Regulation	Input voltage change: ±1%	3.3V output	--	--	1.5	--
			Other output	--	--	1.2	
	Load Regulation	10%-100% load	3.3V/5V output	--	--	20	%
			Other output	--	--	15	
	Ripple & Noise**	20MHz bandwidth	3.3V output	--	100	150	mVp-p
			Other output	--	80	120	
	Temperature Coefficient	Full load		--	±0.02	--	%/℃
	Short-circuit Protection			Continuous, self-recovery			
General Specifications	Isolation	Input-output, with the test time of 1 minute, the leakage current < 1mA		5000	--	--	VAC
				6000	--	--	VDC
	Patient Leakage Current*	250VAC, 50/60Hz		--	--	2	μA
	Insulation Resistance	Input-output, isolation voltage 500VDC		1000	--	--	MΩ

	Isolation Capacitance	Input-output, 100kHz/0.1V	--	4	--	pF
	Operating Temperature	Derating when operating temperature≥ 85℃ (see Fig. 2)	-40	--	105	℃
	Storage Temperature		-55	--	125	
	Case Temperature Rise	Ta=25℃	--	25	--	
	Pin Soldering Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	300	
	Storage Humidity	Non-condensing	5	--	95	%RH
	Switching Frequency	5V input, 100% load	--	300	--	kHz
		12/15/24V input, 100% load	--	200	--	
	MTBF	MIL-HDBK-217F@25℃	19360	--	--	k hours
	Creepage & Clearance Distance		5	--	--	mm
Mechanical Specifications	Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)				
	Dimension	19.50 x 9.80 x 12.50 mm				
	Weight	4.0g(Typ.)				
	Cooling Method	Free air convection				

Note:

①The "parallel cable" method is used for Ripple and Noise test.

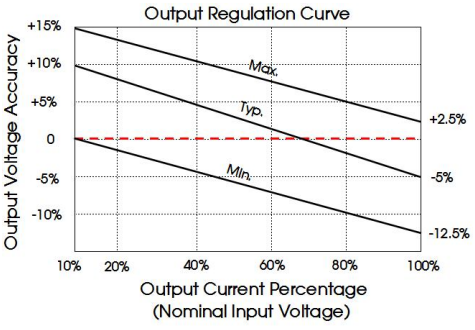
②Leakage current and reinforced insulation is based on 250 VAC, 50/60 Hz system input voltage.

Electromagnetic Compatibility (EMC)

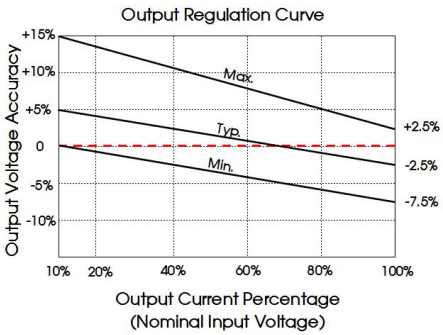
Electromagnetic Compatibility (EMC)	Emissions (EMI)	CE	DFS1-H0515 DFS1-H0524 DFS1-G0515	CISPR32/EN55032 CLASS A (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS A (see Fig. 4 for recommended circuit)
			Other Part No.	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 4 for recommended circuit)
		RE	DFS1-H0515 DFS1-H0524 DFS1-G0515	CISPR32/EN55032 CLASS A (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS A (see Fig. 4 for recommended circuit)
			Other Part No.	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 4 for recommended circuit)
	Immunity (EMS)	ESD		EN60601-1-2 (IEC/EN61000-4-2) Air ±15kV, Contact ±8kV perf. Criteria B

Characteristic Curve

3.3VDC output



5VDC output



Other output

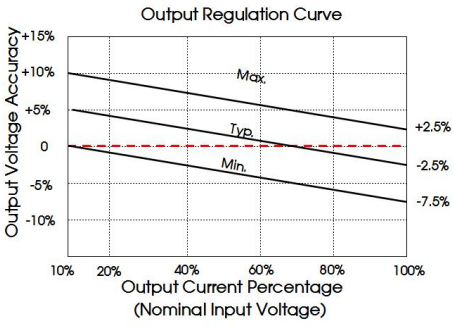


Fig. 1

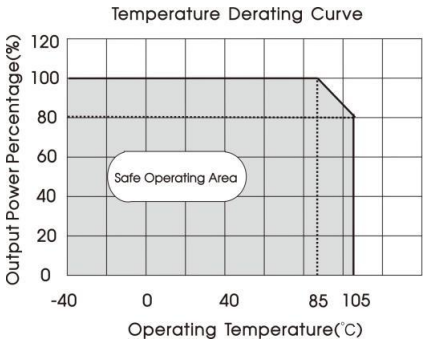


Fig. 2

Design Reference

1. Typical application

If it is required to further reduce input and output ripple, a filter capacitor can be connected to the input and output terminals, see Fig.3. Moreover, choosing suitable filter capacitor is very important, start-up problems may be caused by too large capacitance. To ensured the modules running well, the recommended capacitive load values as shown in Table 1.

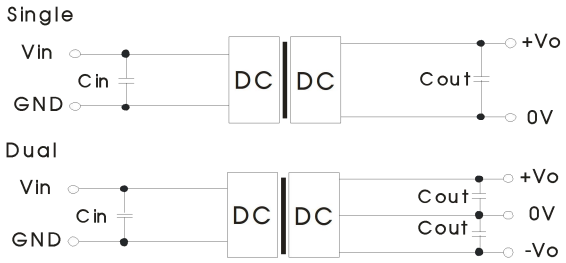


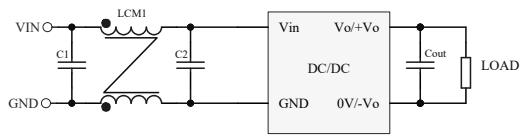
Fig. 3: Typical circuit diagram

Table 1: Recommended input and output capacitor values

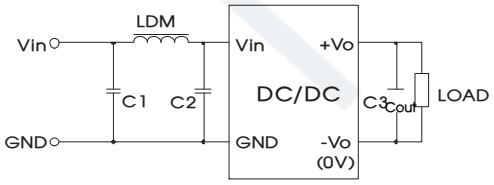
Vin	Cin	Single Vout	Cout	Dual Vout	Cout
5VDC	10μF/10V	3.3/5VDC	10μF/16V	±3.3VDC	4.7μF/16V
12VDC	10μF/25V	9VDC	10μF/16V	±5/±9VDC	4.7μF/16V
15VDC	1μF/25V	12VDC	2.2μF/25V	±12/±15VDC	1μF/25V
24VDC	2.2μF/50V	15VDC	1μF/25V	±24VDC	0.47μF/50V
--	--	24VDC	0.47μF/50V	--	--

2. EMC (CLASS B) compliance circuit

5V input



12V/15V input



24V input

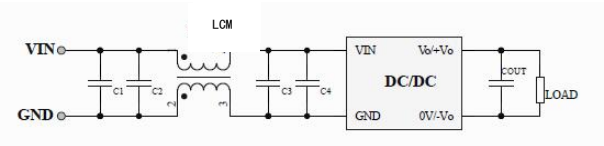


图 4

EMC recommended circuit value table (Table 2)

Input voltage		DFS1-H05xx	DFS1-G05xx
Emissions	C1/C2	4.7μF /16V	22μF /16V
	Cout	Refer to the Cout in table 1	
	LCM1	22μH（Nickel zinc inductance）	

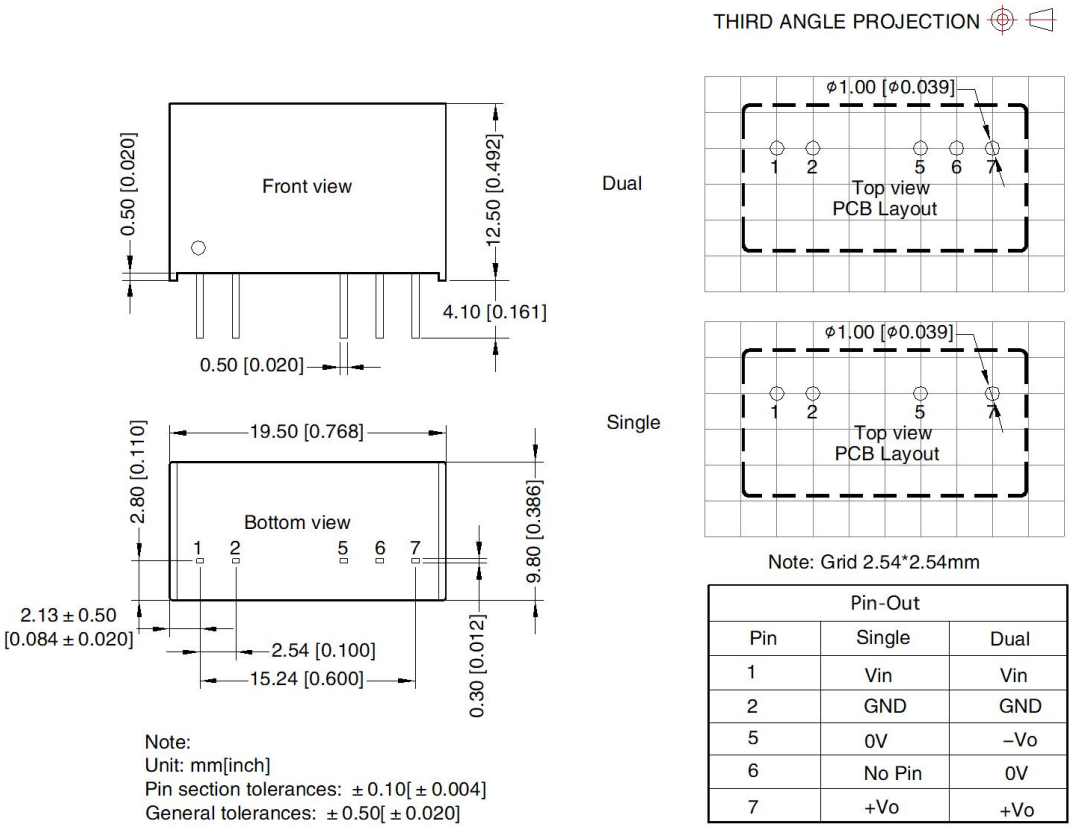
Input voltage		12/15 VDC
Emissions	C1/C2	4.7μF /25V
	Cout	Refer to the Cout in table 1
	LDM	22μH（Nickel zinc inductance）

Input voltage			24 VDC
Emissions	C1/C2		4.7μF /50V
	C3	DFS1-G24xx	100μF /50V
		Other output	4.7μF /50V
	C4	DFS1-G24xx	--
		Other output	4.7μF /50V
	COUT		Refer to the Cout in table 1
	LCM		22μH（Nickel zinc inductance）

3. Minimum Output Load Requirement

For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption is

Dimensions and Recommended



Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]

Note: Grid 2.54*2.54mm

Pin-Out		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
5	0V	–Vo
6	No Pin	0V
7	+Vo	+Vo

Notes:

1. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.